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Atlantic bottlenose dolphins are actively receptive towards humans, and it has been suggested that they are one of the only known wild animals that will seek out human contact (Smith, 1987). The swim-with-dolphins program at Dolphins Plus Research Center allows authorized paying customers the opportunity to swim and interact with dolphins (Smith, Borguss, Borguss, & Borguss, 1987). In order to better understand dolphin interactional preferences for specific types of individuals and the effect of the swim program on participants' mood states, the present study was conducted. Four questions were addressed concerning human-dolphin interactions: First, was there a specific age group that received more interaction as determined by self-report? Second, was there a specific gender that received more interaction as determined by self-report? Third, when addressing information pertaining to general dolphin attention (as measured by a 7-point Likert scale) did gender and/or age influence how much attention participants reported? Fourth, what effect did the swim-with-dolphins program have on participants' mood state?

Results indicated that, in general, the dolphins interacted on a high physical level with individuals in the youngest age category (10-14). When specific interactions, such as pushing, game-playing, and nuzzling were considered, the dolphins revealed gender preferences. Dolphins who engaged in nuzzling and pushing appeared to prefer females for such activities. Conversely, male participants were preferred over female participants for active game-playing behavior.

Statistical analyses performed on the data involving information obtained by Likert scale revealed that age, not gender, was significantly related to the participant's perception of general dolphin attention. The results suggested that participants in age category 10-14 reported significantly more attention than did participants in all the other age categories. In turn, participants in age categories 20-29 and 30-39 reported significantly more attention than did participants in age category 50-90.

The swim-with-dolphins program at Dolphins Plus Research Center appeared to effect the mood states of individuals in age categories 20-29, 30-39, and 40-49. Significant increases from pre-swim mood states to post-swim mood states were reported by these subjects.

EXAMINING SPECIFIC ASPECTS OF HUMAN-DOLPHIN INTERACTIONS IN A "SWIM-WITH-DOLPHINS" PROGRAM

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Introduction

Throughout history, numerous records of dolphins initiating contact and interacting with people have been documented (Smith, 1987). The question of why dolphins choose to interact with humans is still a mystery. According to Smith (1987), "The dolphin is one of the only known wild animals which actually seeks out humans" (p. 38). In 1973, in Fish Hoek Bay off the coast of South Africa, bottlenose dolphins (Tursiops truncatus) were reported to allow humans to handle and even ride them (Ellis, 1989). A current example of dolphins searching out human contact is focused at the Monkay Mia area in Western Australia. Thousands of people travel there yearly for a unique opportunity to touch one of the wild dolphins that enters the cove (Nollman, 1991).

These are not the only places where dolphins have been observed interacting with humans in the wild. For well over a decade, dolphins like Donald of Great Britain and Opo of New Zealand have been widely popularized for their individual contacts with humans in the open ocean (Ellis, 1989). Lockyer studied Donald in great detail, and in 1978, she suggested that he was "solitary and probably an outcast" (Ellis, 1989, p. 77). Bottlenose dolphins are highly social animals and are rarely sighted alone, therefore, Donald's behavior has been interpreted as highly abnormal for this species. No one really knows exactly why these aquatic animals choose human companionship, but it has caught the interest of people all over the world (Smith, Borguss, Borguss, & Borguss, 1987). This interest has led researchers from a wide

variety of professions to study dolphins. Areas such as cognitive abilities, echolocation, and even therapeutic uses have been investigated. Lacking, although, are thorough investigations into what constitutes the basic human-dolphin relationship.

Dolphins are air-breathing, warm-blooded mammals with strong familial relationships and complex social lives (Smith, 1988). Many dolphin species have a brain larger than a human's. Although size alone has very little to do with intelligence, the ratio of brain mass to body, called the encephalization quotient (EQ), allows for comparisons among species. Atlantic bottlenose dolphins, along with other smaller toothed whales, have higher than average EQ's. The only other group known to have above average EQ's among mammals is primates. The degree of folding or convolution and the thickness of the cerebral cortex is another way to evaluate brain power. The bottlenose dolphin's brain is more convoluted than that of any other mammal, including humans. Even though the dolphin's cerebral cortex is only half as thick as a human's, it is still thicker than a chimpanzee's (Livermore, 1991).

Cognitive Abilities

The finding concerning brain size has inspired many researchers to investigate the cognitive abilities of bottlenose dolphins. An inshore species, the bottlenose dolphin is the most popular of all the smaller cetaceans. Widely known because of their appearances in "porpoise" shows, bottlenose dolphins are the most readily available species for scientific study (Lilly, 1961).

John Lilly, a neurophysicist, has been called "the father of modern dolphin research" (Ellis, 1989). He began his studies in 1955, and was able to promote

bottlenose dolphins' ability to imitate human sounds. Lilly's research focused on the possibility of "interspecies communication." He had a full-scale research facility and hoped to actually establish two-way communication with the dolphins. Although his dreams were never truly actualized, Lilly published several books on the topic of human-dolphin communication that remain extremely popular. It has been suggested that he is the person most responsible for the common conceptions and misconceptions concerning dolphins (Ellis, 1989). John Lilly's prediction that dolphins and humans would be able to communicate with each other someday has "touched on a deep-seated human longing to establish contact with other living creatures" (Nollman, 1991, p. 41). Even though Lilly conceptualized interspecies communication as actual conversations where both species would discuss thoughts and feelings, it has been shown that communication can take place in less complex ways.

Louis Herman has led studies that have added significantly to the understanding of dolphin's learning abilities. His basic premise for studying bottlenose dolphins is similar to that stated 15 years ago by John Lilly: complex vocal communication system and high EQ. Herman believes that language comprehension emerges prior to production, therefore suggesting that comprehension is a more fundamental system. Thus, the primary focus of his research has been the study of receptive competencies in his artificial language research with dolphins (Schusterman & Gisiner, 1988). Bottlenose dolphins in Herman's program have learned a complex artificial language involving hand gestures (Herman, 1987). From this language base, Herman claims his research reveals dolphins have a "tacit knowledge of syntactic rules" and are able

to comprehend thousands of novel sentences each up to 5 words in length (Herman, 1988, p. 51). In addition, by developing signs for concepts like the conjunction "and," plus training the dolphins to imitate a specifically referenced individual, Herman and his colleagues have substantially increased the ability to communicate complex and meaningful information to the dolphins (Herman, 1987).

Bottlenose dolphins are considered acoustically oriented and acoustically specialized mammals. There are many documented cases of bottlenose dolphins displaying levels of high performance on complex cognitive tasks where only acoustic information was used. More recently, however, the bottlenose dolphins' ability to complete equally complex cognitive tasks using only visual information has been reported (Herman, Morrel-Samuels, & Pack, 1990).

In these studies, the ability of two bottlenose dolphins to interpret and understand video displays of familiar gestures, previously only presented live by trainers at tankside, was tested. The gestures familiar to the dolphins were composed of hand movements asking for a specific response or sequence of events, as observed in the strings of gestures representing a sentence. Previous studies have revealed that a dolphin's interpretation of a sign is primarily contingent on the position of the trainer's hand motion in relation to the rest of the body and the completion of the gesture's path. Humans proficient in dolphin sign language were tested and they indicated similar response patterns - suggesting reliance on the same "formational features" dolphins use. These data propose that gestures and a code for representations include information on the formational properties of the gesture.

According to Herman et al. (1990), if this same assumption holds true for dolphins then degradations (radical transformations) of signals should be interpreted without specific training, just as comprehension of such is not lost by humans despite degradations resulting from frequency-amplitude manipulations.

The dolphins in these experiments were presented with gestural stimuli that ranged from veridical displays of a trainer signing to extremely abstract point-light displays. In the point-light display technique, the signer wore a black sweatshirt with his hands covered with black gauntlets as he held a dowel with a globe of spongy yellow foam attached to it.

In the first study, an underwater television monitor was involved to test recognition and interpretation of "dynamic images" of the signers on a video monitor. The experiment began with veridical images of the subjects' arms, head, and upper body. Using in-between steps, the gestures were then degraded to point-light displays. In the second study, dolphin and human comprehension of both initial reaction to veridical images and the point-light display condition was compared (Herman et al., 1990). Herman et al. (1990) reported, "The two studies furnish comparative data on visual perception in dolphins and humans and allow us to make some inferences about the functional role of mental representations and gramaticality during gesture recognition" (p. 216). The performance levels achieved by the dolphins in these experiments appear to support the contention that bottlenose dolphins are also well equipped for interpreting complex visual information, even though they are usually thought of as "acoustic" mammals (Herman et al., 1990).

Therapy

Given their remarkable abilities and active receptivity towards humans, dolphins have been selected to serve as "facilitators" for the "disabled." Domestic animals such as dogs, cats, and doves also have been involved in therapeutic programs with children and adults. However, it has been observed that dolphins retain a natural spontaneous play repertory unlike these other animals (Smith, 1988). These other species also do not have the intelligence of the dolphin, which is the salient difference. For example, a dog will return a ball in a stereotyped manner to an autistic person as long as the dog is rewarded. The dolphin, however, will constantly change the patterns of the game. For example, if the person gets bored with the ball, the dolphin will involve another object to play with or will playfully push the person along in the water. Dolphins communicate through a variety of body language and sounds. Specific disabilities, such as autism, require that subtle body cues be interpreted in order to understand and communicate (Smith, 1987). It appears dolphins maintain the ability to perceive such cues without difficulty in the water. Smith (1987) reported, "Dolphins can move with people in an easy and natural way; they are excellent at reading the body language of people" (p. 387).

Dolphin therapy is not a new concept. Therapists, such as Smith and Nathanson, have been involving dolphins in the water with their patients for over a decade (Smith, 1988). The desired outcome from these experiences is some degree of improvement in their clients. After several studies involving "dolphin therapy," these therapists have come to similar conclusions that these mammals, at least for autistic,

learning disabled, and emotionally damaged individuals, can improve the quality of life (Smith, 1988).

In 1972, Henry Truby, President and Director of Scientific Research at the World Dolphin Foundation, observed that children who were neurologically impaired responded exceptionally when in close contact with free-swimming dolphins (Smith, 1983). In 1972, Smith observed unusual responses when a project dolphin interacted with a disabled adult. The typically aggressive adolescent dolphin became gentle and attentive when David, the disabled individual, initiated contact with the dolphin in the water. Usually slow to adapt to novel stimuli, David verbalized and interacted with the dolphins playfully.

This initial finding motivated Smith; and in 1978, she investigated whether dolphins could assist her in trying to enter the guarded world of eight autistic children. Called "Project Inreach," her program explored the ability of Atlantic bottlenose dolphins to elicit communication responses from autistic children, it was one of the first swim-with-dolphins therapies. Her research was conducted at Dolphins Plus in Key Largo, Florida, one of the four marine mammal facilities authorized to allow paying customers to swim with dolphins. It is also one of only three facilities that hosts individuals with disabilities (Smith, 1983). From this project, Smith reported, "The most important development was the consistent increase of sustained attention span during and after each dolphin-child encounter" (Smith, 1983, p. 465). These interactions were able to increase attention spans up to one hour in children who, before the experience, were reported to have attention spans of

only 5-10 minutes. Another important documented action occurred when one of the subjects initiated simultaneous cooperative movement with another autistic child. Neither child had been observed displaying interactive play before the fifth session. Basically, both children each wanted the one bucket so they could pour water on the dolphins during the session. Instead of acting frustrated, each child held a side of the bucket, lifted it together, and poured the water into the tank (Smith, 1983).

Positive results of "Project Inreach" prompted Smith to conduct a more formal study. In 1987, seven severely autistic children participated in her study. Four of the seven children played with dolphins, under strict supervision and close contact with therapists. This regimen occurred twice a day for one week. The control group, which was made up of the other three children, played and swam at the same time, for the same amount of time, at a local park in Key Largo. Positive results revealed more interaction among children who played with the dolphins, while there was difficulty getting the control group to participate in activities. Although Smith believes that dolphins can help the disadvantaged in ways unique to other therapies, she remains tentative. Smith (1988) stated, "There is no hard scientific evidence that dolphins are more effective than any other therapy. There is a real need for more study" (p. 465).

Nathanson (1989) conducted research involving mentally disabled boys between the ages of two and six. He hypothesized that dolphins could provide a strong stimulative effect on children by increasing attention spans and thereby improving retention in learning situations. He taught the disabled boys everything from the

alphabet to complete words, involving dolphins as both stimulus and reinforcement. Results indicated the boys in the dolphin study learned 2 to 10 times faster when compared with the speed of learning of children he had worked with in the land-based classroom. Nathanson (1989) proposed, "That this finding demonstrates that dolphins can enhance the attention span of mentally disabled children and thus increasing the rate of learning" (p.237).

Nathanson's (1989) study investigated learning effectiveness in water with dolphins as compared to learning effectiveness in a classroom based on land. However, it is widely known that water in itself is an effective stress reducer. Especially useful in clinical populations, water therapy can establish both physical and emotional states beneficial for learning new materials. Twenty-five adolescents with mental retardation yielded significant increases in self concept and cardiovascular efficiency when they participated in a Special Olympics swim training program as compared to a control group receiving no training in water (Wright & Cowden, 1986). Therapeutic aquatics programs for head and spinal cord injury patients have revealed measurable stress reduction (Slade & Simmons-Grad, 1987).

Therefore, to control for the possible therapeutic benefits of water by itself, Nathanson and Faria (1993) conducted a study involving the reinforcement effectiveness of water without dolphins as compared to water with dolphins. Research took place at either Dolphin Research Center or the Gulfview Motel. Similar environments were created. The participants involved were eight children with mental disabilities ranging in age from three to eight years old. Developmental delay

and multiple disabilities were apparent in each child. The items to be learned by the children were a circle, rectangle, or triangle. In baseline, each child was reinforced with his or her favorite toy, which differed for each child. Single-subject, multiple baseline across settings research designs were used to assess in water work with dolphins versus in water work without dolphins. Those children working in the water without a dolphin were reinforced with their favorite toy, while those working with a dolphin were reinforced by touching, kissing, or taking a short ride by holding on to the dorsal fin of the dolphin (Nathanson & Faria, 1993).

Results indicated higher cognitive improvement (faster learning) with the children when they worked in the water with the dolphin(s) vs. in the water with a favorite toy. For example, a high verbal response rate was maintained at the Dolphin Research Center throughout all trials, while verbal response rate dropped between the first 9 trials and Trials 10-18 at the Gulfview Motel. Both the 1989 and 1993 Nathanson studies indicate that structured in-water interactions between dolphins and disabled children can reveal significant results (Nathanson & Faria, 1993).

Human-Animal Research

The utilization of animals as adjuncts to therapy dates back to prehistoric times. Animals in mythology and the paintings of bison and galloping horses done by Paleolithic humans reveal the human-animal bond is certainly not a new discovery (Netting, Wilson, & New, 1987). The first recorded settings where animals were introduced with therapeutic intent was the York Retreat in England in 1792, and the Bethel Community in Germany in 1867. The York Retreat was one of the first places

where the mentally ill were treated humanely rather than cruelly. The guiding principle of this early experiment in animal-facilitated therapy was that the mentally ill might learn self-control by having dependent upon them creatures weaker than themselves. The patients cared for such small animals as rabbits and poultry (Netting et al., 1987). At Bethel, a German home for epileptics, birds, cats, dogs, and horses were introduced and the patients were allowed to interact and care for them. Even today, one of the primary methods of treatment at Bethel is the utilization of animals. In the United States, the first recorded use of animals in a therapeutic setting was at the Air Force Convalescent Hospital in Pawling, New York in the 1940's when animal usage was meant to benefit patients through touching and tending (Netting et al., 1987).

The work of the late child psychologist, Boris Levinson is largely responsible for the current interest in the value of the human-animal bond (Draper, Gerber, & Layng, 1990). Following World War II, Levinson accidentally discovered the benefits of using a dog in therapy sessions with a disturbed child. When the child and his mother arrived early for their appointment, Levinson's dog, Jingles, was there. The child had remained non-verbal in prior sessions, thus the child's verbal response to Jingles caused Levinson to evaluate the possible advantages of using a dog as a communication link between child and therapist. Levinson's suggestion that animals used for psychotherapeutic work be carefully trained, plus his plans for well-designed research projects, caused many others to prospect the possibilities of animal-facilitated therapy.

The literature on human-animal bonding has grown rapidly (Zeglen, Leed, & Brudvik, 1984). The past decade has brought together a multitude of professionals from different fields to explore the meaning of the "human-animal bond." Increasingly, programs involving the disabled, the elderly, and other special population groups have been developed. Although this area has grown substantially, it has not been without severe criticism. Beck and Katcher (1984) explain how the majority of research consists of "descriptive studies with cases reported anecdotally with no formal design or controls" (p. 415).

It also is apparent that the lack of a conceptual framework leaves this area without an emphasis. In order to address these issues, the "Delta Society Invitational Conference for Research on the Interactions of Animals and People" was convened May 6, 1984 (Zeglen et al., 1984). The goal of the conference was to "determine the research questions that need to be studied in the human-animal bond and the best strategies for addressing them" (Zeglen et al., 1984, p. 10). In addition to stressing issues such as methodological recommendations, other areas for further study or emphasis were suggested. Several suggestions were made to broaden the range of human-animal relationships being studied. Research dealing with abnormal rather than normal populations has been more common. There is a need to fully understand normal attitudes and normal behavior concerning animals, instead of restricting research to atypical populations.

It was this suggestion that guided the direction of the present research study which was conducted at Dolphins Plus Research Center in Key Largo, Florida. This

marine mammal center is the only free-swimming dolphin program in the United States. Specially acclimated dolphins and water-oriented humans are able to make contact in a natural environment. The swim sessions are unstructured which is important due to the fact that the 8 dolphins involved in the program have the choice of interacting or not during the designated swim time (Smith, 1987). The dolphins are not trained to do tricks or work for food. Those who participated had to pay a $65 fee and be 10 years or older with previous mask and snorkel experience.

The site of Dolphins Plus is a deep, man-made cove located on a flow-through canal that has open access to the Atlantic Ocean (Smith et al., 1987). The actual swimming area in the cove is approximately a 60' x 75' area that is divided by a fence. Both pens contain an underwater escape area where only the dolphins are allowed to go if they wish to not participate in the swim.

Seven of the adult dolphins involved in the swim program were females, 1 was male. In each swim area there were 4 dolphins. The maximum number of human participants allowed per area was 8. The participants were allowed to swim freely with the dolphins for 30 minutes, following an hour-long standardized pre-swim briefing.

The briefing established the rules of the swim and explained how to interact with the dolphins. The swim programs took place daily at 9 a.m. and 2 p.m. Each program consisted of an A and B group with a maximum of 16 participants in each group. Group A went first, followed by a 30-minute break, then Group B participated.

During the swim session, there were approximately eight behaviors which commonly occurred if interaction took place. The first behavior was towing. Towing was when the dolphin offered a participant its dorsal fin. The person then gently took hold of the fin and was "towed" around the pen. This behavior was the most possessive one and was categorized as high physical contact. The second behavior was rubbing. Rubbing occurred when the dolphin swept across a portion of the participant's body, or rubbed on a part of the person's body. This activity was also designated as high physical contact. Nuzzling was the third behavior; it required that the dolphin place its snout (rostrum) on a part of the participant's body. Typically, nuzzling occurred on the person's knee area and was also another form of high physical contact. The last form of high physical contact was "mouthing," in which the dolphins would caress a swimmer with their teeth by placing a part of the swimmer's arm or leg in their mouth. Categorized as "active" contact, game playing was another form of interaction. Game playing could take the form of mimicking behaviors or swimming in circles with the person.

The only two aggressive behaviors that typically occurred were tail slapping and jaw clapping. Tail slapping occurred when the dolphin positioned itself next to the person and forcefully slapped its tail on the surface of the water. Jaw clapping was more aggressive and occurred when the dolphin positioned itself in front of the individual and opened and closed its jaws. Aggressive behaviors at Dolphins Plus were reported to be minimal.

There were many aspects to consider when addressing the area of interspecies contact between dolphins and humans. Dolphins Plus was an optimal facility to research such questions about interactions between normal populations and Atlantic bottlenose dolphins. Of specific interest to participants was the question of who receives the most interaction and why. The answer to this question could help provide the facility valuable information concerning those who might receive the most attention and also possible dolphin preferences. Another question of interest was whether mood state changed significantly as a result of the swim-with-dolphins program.

CHAPTER 2

Method

Subjects

The subjects were 1022 volunteer participants involved in the Swim-With-Dolphins program at Dolphins Plus Research Center in Key Largo, Florida, from the months June through July, 1993. Four hundred twenty-one subjects were men/boys and 601 subjects were women/girls. The mean age of the entire sample was 29 years.

Instruments

The instrument employed was a 5-page questionnaire divided into 2 sections by a red page indicating to the subjects to stop (see Appendix A). The first section of the questionnaire asked for the following demographic information: age, weight, height, gender, marital status, number of children, occupation, total number of previous personal contacts with dolphins, and approximate total time spent with dolphins. Also, swimming and snorkeling ability was self-rated on a Likert Scale that ranged from 1 (lowest ability) to 7 (highest ability). The last part of the first section was a version of the Wessman and Ricks Mood Measurement Scale as adapted by Thomas A. Van Dillon in 1990. This scale contained 11 statements ranging from unhappy to happy moods (or elation vs. depression) on an incremental basis (Wessman & Ricks, 1966). The data from the first part of the questionnaire constituted the pre-swim information.

The second section of the questionnaire contained the same modified Wessman and Ricks Mood Measurement Scale and a self-report page. The self-report page consisted of questions pertaining to types of interactions, whether they occurred, and if so, for how long (see Appendix A). These interactions included three categories: (high physical contact) tow, rub, nuzzle, mouth, push, (active play) game, and (aggressive behaviors) tail slap and jaw clap. An eight-point Likert Scale asking about how much attention each individual received concluded the questionnaire. Zero represented no attention, while seven was the highest amount possible.

Procedure

Before the pre-swim briefing, the subjects were introduced to the study and provided an option of participating or not. Those who volunteered were instructed to read and sign a consent form document. The pre-swim portion of the questionnaire was completed at this time. The subjects were instructed to return to the same location after the swim. Upon completion of the swim, the participants finished the second portion of the questionnaire. At this time, the subjects were then allowed to ask any questions they may have had concerning the study.

CHAPTER 3

Results

The present study addressed four questions concerning what types of individuals dolphins at Dolphins Plus Research Center were most attracted to, as defined by specific dolphin behaviors. First, was there a specific age group which received more dolphin interaction as determined by self-report? Second, was there a specific gender which received more dolphin interaction as determined by self-report? Third, when addressing information obtained by the Likert scale for self-reported dolphin attention, did gender or age influence how much attention they reported? Fourth, did the dolphin swim program effect participants' overall mood state? The results pertaining to each question will be discussed separately.

Age Effects On Dolphin Interactions

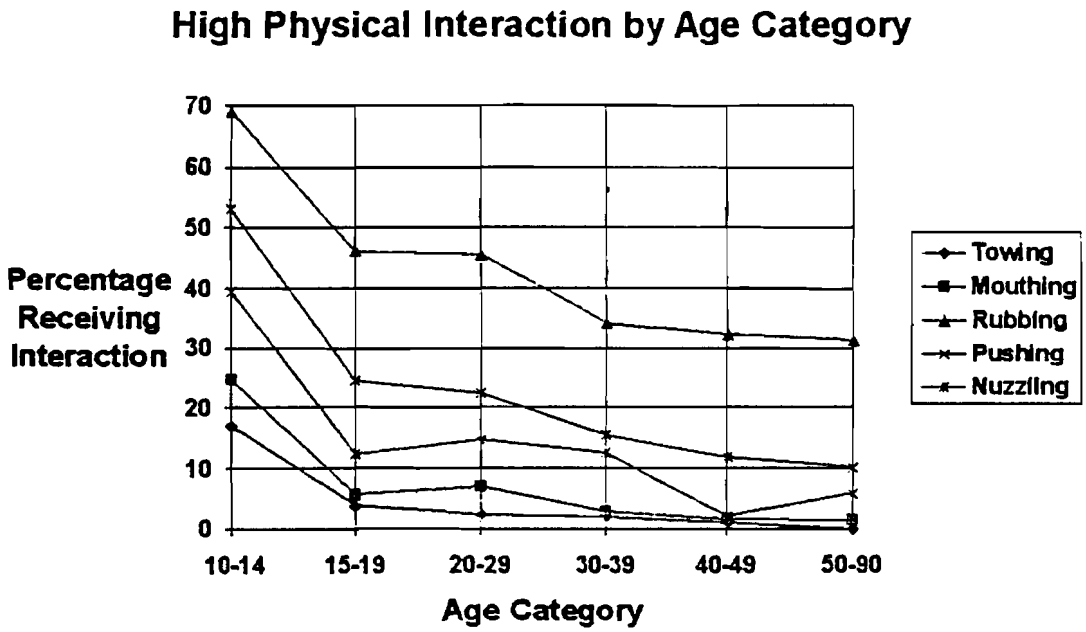
The issue concerning whether specific ages receive more dolphin interactions than others was analyzed. Six age categories were created: 10-14, 15-19, 20-29, 30-39, 40-49, and 50-90 years. The age category 10-14 was specifically created in order to include only those participants considered children. The last age category included persons aged 50-90 due to the small number of volunteers in that age group. A series of Chi-square statistics was performed with the groups divided into those who received interactions and those who did not across each age category.

The Chi-square statistical procedure performed on the towing behavior data yielded significance, $\underline{x}^2$ (5, $\underline{N}$ = 1004) = 80.75, $\underline{p} < .001$. Refined Chi-square analyses were performed by partitioning the omnibus Chi-square table into five 2 x 2

tables (was the behavior experienced, yes vs. no; two age categories). These tables addressed which age categories contributed the most to the overall Chi-square by first comparing age category 10-14 with the collapsed data from the other age categories. The second table compared age category 15-19 with the collapsed data from the other age categories minus the first age category. Each table thereafter followed the same pattern, with the final table comparing the last two age categories alone. These results indicated that the distribution of towing behavior responses for subjects aged 10-14 differed significantly from the distribution of towing behavior responses for subjects above age 14, $\underline{x}^2$ (1, $\underline{N}$ = 1004) = 78.65, $\underline{p}$ < .001. Nonsignificance for the remaining focused Chi-square tests suggested that the choice of subjects aged 10-14 made a major contribution. Visual inspection of the percentages supports conclusions drawn from Chi-square analyses. Percentages of reported towing behavior by participants within each age category can be seen in Figure 1.

When mouthing behavior of the dolphins was involved as the dependent variable, the omnibus Chi-square statistic also yielded significance, $\underline{x}^2$ (5, $\underline{N}$ = 1006) = 100.67, $\underline{p}$ < .001. Using the partitioning method described above, calculations indicated that the distribution of mouthing behavior responses for subjects age 10-14 differed significantly from the distribution of mouthing behavior responses for all subjects above age 14, $\underline{x}^2$ (1, $\underline{N}$ = 1006) = 95.02, $\underline{p}$ < .001. These results suggest that participants in age category 10-14 appear to be highly associated with receiving mouthing behavior from the dolphins. The distribution of mouthing behavior

Figure 1


High Physical Interaction by Age Category
Percentage Receiving Interaction
70
60
50
40
30
20
10
0
10-14
15-19
20-29
30-39
40-49
50-90
Age Category
Towing
Mouthing
Rubbing
Pushing
Nuzzling

responses for subjects age 20-29 significantly differed from the distribution of mouthing behavior responses for all subjects above age 29, $\underline{x}^2$ (1, $\underline{N}$ = 705) = 4.35, $\underline{p} < .05$. When comparing the responses of subjects over age 29 with the responses of those subjects in the 20-29 age category, those subjects over age 29 appear to be associated with not receiving mouthing behavior from the dolphins. This result does not indicate that those participants in the 20-29 age category are highly associated with receiving dolphin behavior, but instead reveals that those participants above age 30 are receiving significantly lower amounts of dolphin activity than those in the 20-29 age category. Percentages of reported mouthing behavior by subjects within each age category can be viewed in Figure 1.

Rubbing behavior by the dolphins was evaluated using a Chi-square statistic. The omnibus Chi-square yielded significance, $\underline{x}^2$ (5, $\underline{N}$ = 1004) = 75.02, $\underline{p} < .001$. Further partitioning of the overall Chi-square matrix, as used previously, revealed results similar to those reported for mouthing behavior. The distribution of rubbing behavior for participants age 10-14 differed significantly from the distribution of rubbing behavior for all subjects above 14, $\underline{x}^2$ (1, $\underline{N}$ = 1004) = 62.03, $\underline{p} < .001$. These data suggest that those individuals in the age category 10-14 are highly associated with receiving rubbing behavior from the dolphins. However, the distribution of rubbing responses for subjects age 20-29 differed significantly from the distribution of rubbing responses for all subjects above 29, $\underline{x}^2$ (1, $\underline{N}$ = 703) = 9.6,

$p < .01$. Thus, participants above age 29 appear not to be associated with rubbing behavior when compared to participants in the age category 20-29. Percentages of reported rubbing behavior for all 6 age categories are shown in Figure 1.

The Chi-square analysis performed involving pushing behavior by the dolphins yielded an omnibus significant result, x^2 (5, N = 1000) = 29.8, $p < .001$. As with mouthing and rubbing behaviors, further subdividing of the Chi-square table indicated that the distribution of pushing behavior for participants age 10-14 differed significantly from the distribution of pushing behavior for all participants above age 14, x^2 (5, N = 1000) = 106.95, $p < .001$. Likewise, the distribution of pushing behavior for subjects age 20-29 differed significantly from the distribution of pushing behavior for those subjects above 29, x^2 (1, N = 701) = 4.86, $p < .05$. Unlike the results of the mouthing and rubbing analyses, the distribution of pushing responses for subjects age 30-39 differed significantly from the distribution of pushing behavior for all subjects above 39, x^2 (1, N = 488) = 8.4, $p < .01$. These results suggest that compared to those individuals in the age category 30-39, participants above age 39 are less likely to receive pushing behavior from the dolphins. Percentages of reported pushing behavior by participants, within each age category, are graphically depicted in Figure 1.

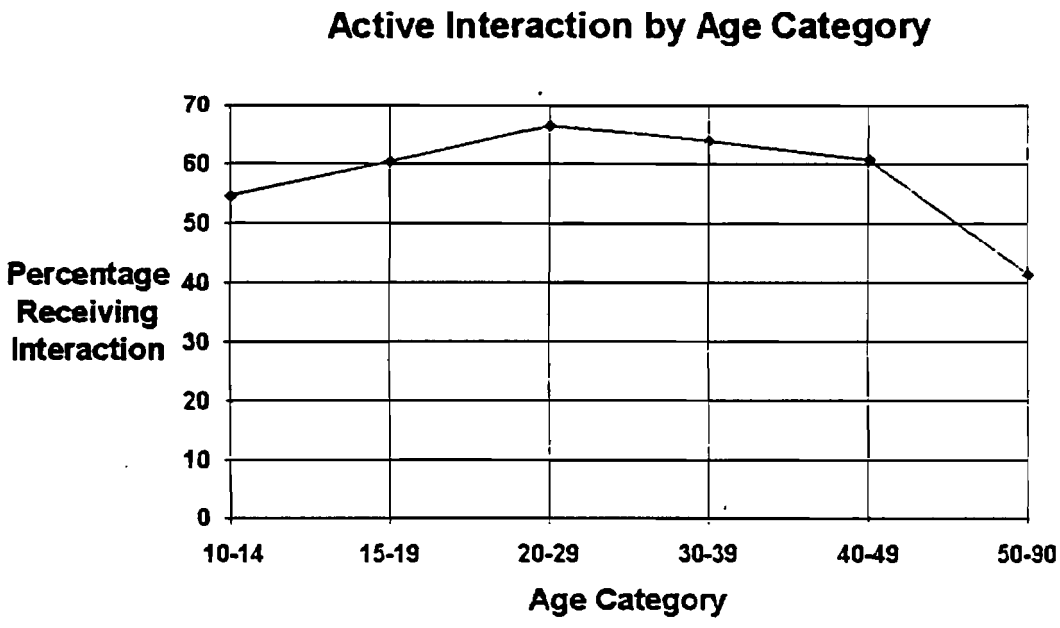
The analysis of nuzzling behavior yielded a significant omnibus Chi-square, x^2 (5, N = 1001) = 122.70, $p < .001$. Refined analyses, using the previously described partitioning method, indicated that the distribution of nuzzling responses in age category 10-14 differed significantly from the distribution of responses for those

subjects above age 14, $\underline{x}^2$ (1, $\underline{N}$ = 1001) = 114.78, $\underline{p}$ < .001. Further, the distribution of nuzzling behavior responses for those subjects age 20-29 also differed significantly from the nuzzling response distribution for those individuals above 29, $\underline{x}^2$ (1, $\underline{N}$ = 701) = 6.48, $\underline{p}$ < .05. Comparison of the responses indicated by subjects over age 29 with those in the 20-29 age category indicated that those subjects over 29 appear to be associated with not receiving nuzzling behavior from the dolphins (see Figure 1).

Analysis of active game-playing behavior also yielded a statistically significant omnibus Chi-square, $\underline{x}^2$ (5, $\underline{N}$ = 994) = 17.18, $\underline{p}$ < .001. Further analyses of the Chi-square table, involving the previously described partitioning method, indicated that only the distribution of game-playing responses for those subjects age 40-49 differed significantly from the distribution of game-playing responses for those subjects above 49, $\underline{x}^2$ (1, $\underline{N}$ = 274) = 8.11, $\underline{p}$ < .01. Thus, participants above age 49 appear to be associated with not receiving game-playing behavior. Reported game-playing behavior by the subjects, as depicted in percentages, is shown in Figure 2.

Even though age was not anticipated to be related to the display of aggressive behaviors by the dolphins, the omnibus Chi-square for tail-slapping yielded significance, $\underline{x}^2$ (5, $\underline{N}$ = 1004) = 15.71, $\underline{p}$ < .01. Partitioning of the Chi-square table revealed that the distribution of tail-slapping responses for those participants in age category 10-14 differed significantly from the distribution of tail-slapping responses for those individuals above age 14, $\underline{x}^2$ (1, $\underline{N}$ = 1004) = 13.41, $\underline{p}$ < .01.

Figure 2


Active Interaction by Age Category
Percentage Receiving Interaction
70
60
50
40
30
20
10
0
10-14
15-19
20-29
30-39
40-49
50-90
Age Category

As no additional focused comparison yielded significance, tail-slapping behavior appears to be directed toward the individuals in the youngest age category. The omnibus Chi-square statistic for jaw-clapping did not reveal significance, $\underline{x}^2(5, \underline{N} = 994) = 7.81$, $\underline{p} < .168$. Reported tail-slap and jaw-clap behaviors by subjects within each age category are shown as percentages in Figure 3.

Gender Effects On Dolphin Interactions

Investigation into the effect of gender on self-reported dolphin interactions was conducted by using a series of Chi-square statistics. Subjects were divided into two groups: males and females. The dependent measure was whether or not each interaction occurred (Yes or No). Results indicated that gender played a significant role with only three dolphin activities: nuzzling, game-playing, and pushing.

Analysis of nuzzling behavior revealed that the distribution of responses shown to men/boys differed significantly from the distribution of responses shown to women/girls, $\underline{x}^2$ (1, $\underline{N} = 999$) = 11.79, $\underline{p} < .001$. The percentage of male participants who reported nuzzling activity was 18.43%, while 27.87% of female participants reported being nuzzled (see Figure 4). Thus, it is arguable that the dolphins nuzzled women/girls more than men/boys.

When dolphin game-playing activity was involved as the dependent variable significant results were also obtained, $\underline{x}^2$ (1, $\underline{N} = 992$) = 4.93, $\underline{p} < .05$. Sixty-five percent of male participants reported game-playing activity, while 57.29% of the female participants reported game-played activity (see Figure 4).

Figure 3

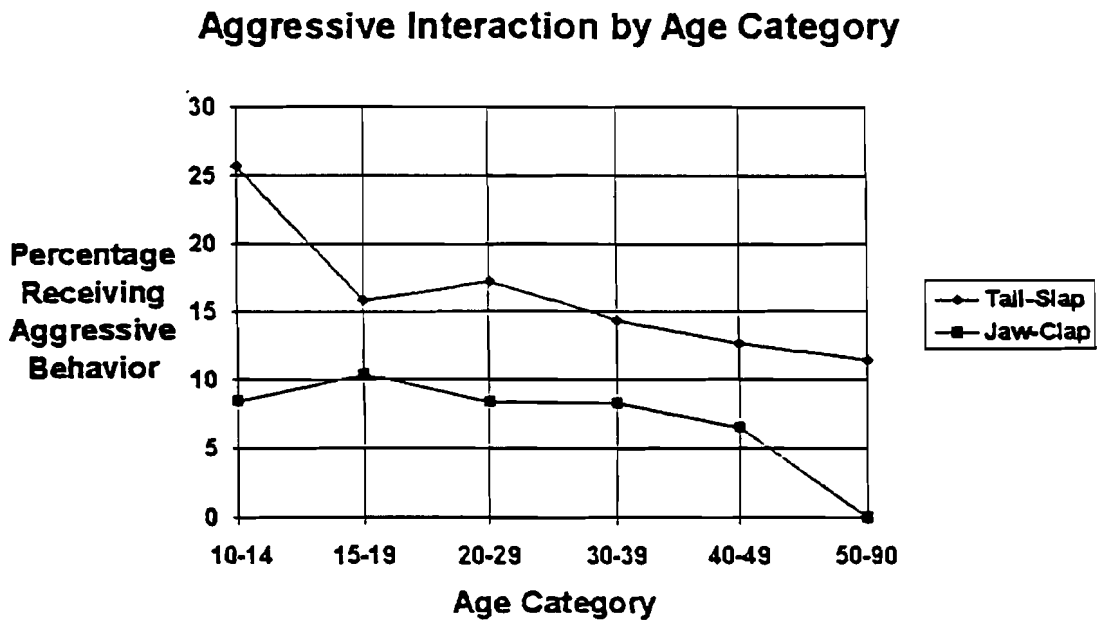
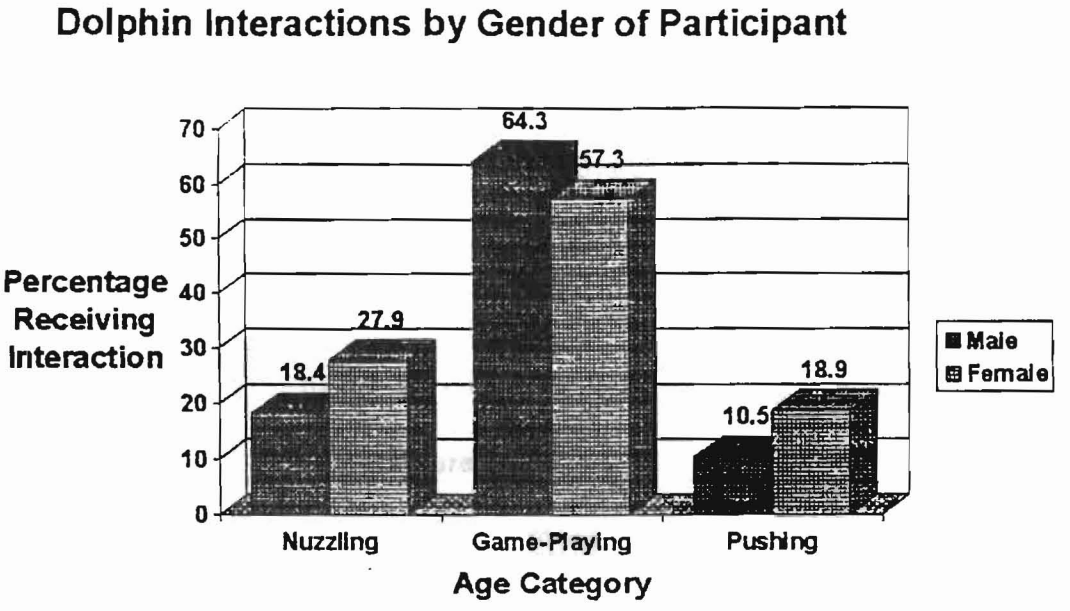

Aggressive Interaction by Age Category
Percentage Receiving Aggressive Behavior
30
25
20
15
10
5
0
10-14
15-19
20-29
30-39
40-49
50-90
Age Category
Tail-Slap
Jaw-Clap

Figure 4


Dolphin Interactions by Gender of Participant
Percentage Receiving Interaction
70
60
50
40
30
20
10
0
64.3
57.3
27.9
18.4
18.9
10.5
Nuzzling
Game-Playing
Pushing
Age Category
Male
Female

Thus, unlike nuzzling, game-playing appeared to be associated with men/boys more than women/girls.

The Chi-square statistical analysis involving pushing behavior by the dolphins indicated that the distribution of responses for men/boys differed significantly from the response distribution for women/girls, $\underline{x}^2$ (1, $\underline{N}$ = 998) = 13.22, $\underline{p}$ < .001. The percentage of females receiving pushing behavior was 18.91% versus 10.91% for males. Thus, pushing behavior by the dolphins appeared to be associated with women/girls more than men/boys (see Figure 4).

Effect of Gender and Age on General Dolphin Attention

In order to determine if gender and/or age was significantly related to the subject's perception of general dolphin attention (as measured by the 7-point Likert scale), a 2 (sex: male or female) X 6 (age: 10-14, 15-19, 20-29, 30-39, 40-49, and 50-90 years) ANOVA was performed. Results failed to yield a significant effect for gender, $\underline{F}$ (1, 1021) = 1.89, $\underline{p}$ = .169, although a significant effect was found for age, $\underline{F}$ (5, 1021) = 8.359, $\underline{p}$ < .001.

Subsequent Newman-Keuls tests indicated that age category 10-14 reported significantly ($\underline{p}$ < .05) more attention than did the other age categories. In turn, participants in age category 20-29 reported significantly ($\underline{p}$ < .05) more attention by the dolphins than did subjects in the age category 50-90. Also, subjects in age category 30-39 reported significantly ($\underline{p}$ < .05) more attention than did those subjects in age category 50-90.

Effect of Swim-Program on Mood

A 2 (sex: male or female) X 6 (age: 10-14, 15-19, 20-29, 30-39, 40-49, and 50-90 years) x 2 (mood state: pre-swim vs. post-swim) repeated measures ANOVA was conducted to examine whether or not there was a significant change in the participants' mood state after they swam with the dolphins.

The main effect for mood state, F (1, 1007) = 18.84, $p < .001$, was found to be statistically significant. Inspection of the two means revealed that mood increased, pre-swim mood scores (M = 7.89) were lower than post-swim mood scores (M = 8.26).

The age X mood interaction also yielded significance, F (5, 1007) = 2.58, $p < .05$. This interaction was probed through simple main effects analyses. The first set of simple main effects analyses evaluated pre- vs. post-swim mood at each age category. Significant differences were found for age categories: 20-29, F (1, 218)= 10.35, $p < .01$; 30-39, F (1, 221) = 8.73, $p < .01$; and 40-49, F (1, 207) = 16.08, $p < .01$. Visual inspection of the means indicated mood scores increased in age categories 20-29, 30-39, and 40-49 (Table 1).

The second set of simple main effects analyses compared age category mood scores within each for the pre- and post-swim mood tests, respectively. A significant effect was found for pre-swim mood state, F (5, 1021) = 18.76, $p < .01$. Further analysis involving the Newman-Keuls procedure indicated that subjects in age category 10-14 began the program with significantly ($p < .05$) higher pre-mood scores than subjects in age categories 20-29, 30-39 and 40-49. A significant effect

also was found for post-swim mood state, F (5, 1021) = 7.90, $p < .01$. Newman-Keuls tests revealed that subjects in age category 10-14 had significantly ($p < .05$) lower post-mood scores than subjects in age category 20-29.

Table I

Pre-Post Swim Mood State Means and Standard Deviations by Age Category

Age Category	Pre-Swim Mood Score	Standard Deviation	Post-Swim Mood Score	Standard Deviation
10-14	8.263	1.696	8.041	2.569
15-19	7.833	1.743	8.269	2.076
20-29	7.913	1.711	8.404	2.147
30-39	7.778	1.532	8.226	2.118
40-49	7.686	1.502	8.314	1.875
50-90	7.646	1.707	8.000	2.100

CHAPTER 4

Discussion

The rationale for the present study was derived from a need to understand normal populations and their interactions with dolphins, as opposed to restricting research to the interactions of dolphins with atypical populations (Zeglen et al., 1984). Nathanson and Faria's (1993) suggestion to conduct interactive research involving possible dolphin preferences for certain types of humans provided a direction for the current study which sought answers to several questions.

The first question considered whether specific ages received more dolphin interaction than others. The results revealed high physical contact interaction by the dolphins to be highly associated with participants in the youngest age category 10-14. However, when game-playing (active interaction) was considered, only those participants over age 50 reported significantly lower amounts of dolphin activity.

When the distribution of the aggressive behaviors (i.e. tail-slapping and jaw-clapping) was evaluated, age was a significant factor only for the display of tail-slapping which appeared to be directed toward participants in age category 10-14. Thus, with the exception of active interactions and jaw-clapping, it can be tentatively concluded that dolphins prefer to interact with the youngest individuals, or those considered children.

Participants in the age category 10-14 appeared to retain some characteristic(s) that greatly distinguished them from participants in the age category 15-19. Most children ages 10-14 are smaller in size and physically weaker than individuals classified as

adolescent or young adult. Children are also typically less aggressive than teenagers. Dolphins may find the qualities of children less threatening and more attractive than qualities possessed by young adults or teenagers. Another possible explanation is that the 10-14 year olds presented themselves in a completely different manner in the water. For example, they may have had higher activity levels or appeared more playful, which in turn the dolphins may have found more attractive.

A second thrust of the present research sought to determine if an analysis of dolphin interactions would reveal a gender preference. Analysis of the data indicated that gender played a significant role in three areas: nuzzling, pushing, and game-playing. Nuzzling and pushing, both high physical contact interactions, were reported by more female participants. Game-playing, which consisted of active play, but no physical interaction, was experienced more often by the male participants. These results suggest that high physical contact may be directed toward females, while active play may be directed toward males. However, the presence of gender effects for only three of the sampled behavior underscores the tentativeness of this conclusion. This latter consideration is highlighted by the fact that gender effects were not obtained on the Likert-scale self-report measure of attention.

Finally, the effect of the dolphin swim program on subsequent post-swim mood scores was evaluated. The results indicated that for subjects in age categories 20-29, 30-39, and 40-49, post-swim mood score increased significantly from pre-swim mood score, while participants in the remaining categories experienced no significant

changes. Thus, the swim program appeared to play a beneficial role for those individuals within the age categories 20-29, 30-39, and 40-49.

Understanding dolphin preferences at Dolphins Plus Research Center could help the facility better prepare its participants for interaction possibilities. Participants could be informed of the statistical probability, based on this study, of receiving a specific type of dolphin interaction. For example, the information concerning dolphin interactional trends might help the participants dispel any predetermined expectations concerning the impending swim.

The age by mood interaction revealed that individuals within age categories 20-29, 30-39, and 40-49 experienced a significant increase in mood state. There are many possible explanations for why these results occurred. For example, the swim-with-dolphins program might have exceeded previous expectations resulting in an increase in mood state.

Participants in the youngest age category (10-14) did not have significantly higher post-mood than pre-mood scores. This may be because frequently it was observed that younger participants were frightened by the amount of interactional attention given to them by the dolphins. Also, subjects in the second youngest age category (15-19) did not report a significant increase in mood state. Individuals in this age group may not have had their expectations for the program exceeded, resulting in no change of mood from pre-swim to post-swim.

Subjects in the 50-90 age category received the least amount of dolphin attention, which could have contributed to why reported post-swim mood states were not

significantly different from pre-swim mood states. This data could be used to inform incoming participants of the statistical results regarding who might benefit most affectively from the program.

Research Implications

Findings concerning the present study broaden the scope of current research involving human-animal relationships. For example, understanding the basic typology of the ways in which dolphins and humans interact can have social and therapeutic benefits.

Results of this study strongly suggest that the dolphins appear to prefer interacting in a highly physical manner with those participants classified as children (10-14). These high physical interactions expressed by the dolphins are social in nature and many of them can be observed occurring within dolphin groups at Dolphins Plus, and within wild pods in the open ocean. Dolphin interactions, which may be overwhelming to some normal children, have been shown to be positive strong stimuli and reinforcement for children with mental disabilities. According to Nathanson & Faria (1993), "The attention deficit hypothesis suggests that the relative inability of people with mental disabilities to learn is primarily a function of a deficit in physiological attention to the relevant dimensions of stimuli, rather than an inability to process information" (p. 17). Nathanson and Faria's 1993 study demonstrated support for the contention that dolphins appear to increase attention, thereby increasing cognitive processes in children with mental disabilities.

The dolphins in this current study interacted more with children from a normal population: If this trend exists in relation to abnormal populations, then children with disabilities may benefit more on a therapeutic level than older individuals with disabilities. For example, the dolphins may be more willing to rub or nuzzle children with disabilities, or respond more attentively to children with behavioral problems versus adults with disabilities.

Another important contribution of this study is the finding that participants from certain age groups (20-29, 30-39, and 40-49) appeared to benefit affectively from the swim-with-dolphins program. These were the only groups which indicated a significant change in mood state from pre-swim to post-swim. The swim-with-dolphins program may not have met or exceeded the expectations of the participants in the remaining age categories. Thorough investigations into emotional responses from participants should be studied in order to better understand how exposure to the program can effect humans. For example, does the program possibly affect attitudes or perceptions about dolphins?

Weaknesses and Suggestions for Further Research

In planning subsequent research in this area, specific weaknesses of the present research should be considered. One problem confronted in this study was the fact that both pen areas contained two completely different dolphin social groups. Each dolphin group of four animals contained dolphins who were considered dominant and were primarily responsible for initiated contact with the participants. It was obvious that only "dominant" dolphins interacted highly with the volunteers. The other

dolphins within the social groups typically refrained from interaction and/or did not initiate interactional activity. Hence, it is difficult to determine whether the other non-dominant dolphins would display the same pattern for human interaction preferences. Thus, in the future, researchers may want to test participants with a single dolphin. Results of this study could provide therapists with information regarding which dolphins might interact most effectively with humans.

The self-report nature of the data also invites the possibility of misinterpretation and/or dishonesty. Similarly, the fact that the aggressive behaviors displayed by the dolphins were difficult for the participants to distinguish may have resulted in biased self-reports. Specific dolphins would occasionally open their jaws directly in front of participants' faces and yet no jaw-clapping behavior would occur. This specific activity occasionally was misinterpreted as jaw-clapping, when it was not. Also, dolphins engaging in mild aggressive bouts with each other would also tail-slap. If a participant was located nearby when this activity occurred, they may have viewed this behavior as an aggressive act displayed toward them. Such problems may be avoided in future use through the videotaping of each session. The videotapes would then be scored by trained observers. Hence, a more objective record of the dolphins' behavior could be directly compared to the self-report data provided by the participants.

Further avenues for study concerning human-dolphin interactions are limitless. For example, what other stimuli do the dolphins attend to when choosing individuals

to interact with? Do they involve such characteristics as personality traits or activity levels of the participants? Another area of study would be to compare reported post-mood scores of participants who actually swim with the dolphins with those individuals who watch the swim session, yet do not actively participate. Would the mood effects be greater for the actual participants, or not? The area of research involving human-dolphin interactions can contribute to the body of knowledge already existing pertaining to animals and their effects on humans.

References

Beck, A. M., & Katcher, A. H. (1984). A new look at pet-facilitated therapy. Journal of the American Veterinary Medical Association, 4, 414-421.

Draper, R. J., Gerber, G. J., & Layng, E. (1990). Defining the role of pet animals in psychotherapy. Psychiatric Journal of the University of Ottawa, 15, 169-172.

Ellis, R. (1989). Dolphins and porpoises, New York: Alfred A. Knopf.

Herman, L. M. (1987). Receptive competencies of language-trained animals. In J. S. Rosenblatt, G. Beer, C. M-C. Busnel, & P. J. B. Slater (Eds.), Advances in the Study of Behavior, 17, 1-60.

Herman, L. M. (1988). The language of animal language research. The Psychological Record, 38, 349-362.

Herman, L. M., Morrel-Samuels, P., & Pack, A. (1990). Dolphin and human recognition of veridical and degraded video displays of an artificial gestural language. Journal of Experimental Psychology: General, 119, 215-230.

Lilly, J. C. (1961). Man and dolphin. New York: Doubleday & Company.

Livermore, B. (1991). Water wings: Swimming with dolphins may be the boost special kids need. Seafrontiers, 37, 44-54.

Nathanson, D. E. (1989). Using Atlantic bottlenose dolphins to increase cognition of mentally retarded children. In P. Lovibond & P. Wilson (Eds.), Clinical and Abnormal Psychology (pp. 233-42). North Holland: Elsevier.

Nathanson, D., & Faria, S. (1993). Cognitive improvement of children in water with and without dolphins. Anthrozoos, 6, 17-29.

Netting, E. F., Wilson, C. C., & New, J. C. (1987). The human-animal bond: Implications for practice. Social Work, pp. 60-64.

Nollman, J. (1991). Dolphins. The Animals' Agenda, 2, 21-24.

Schusterman, R. J., & Gisiner, R. (1988). Artificial language comprehension in dolphins and sea lions: The essential cognitive skills. The Psychological Record, 38, 311-348.

Slade, C., & Simmons-Grad, B. (1987). Therapeutic swimming as a community based program. Cognitive Rehabilitation, 5, 18-20.

Smith, B. A. (1983). Project Inreach: A program to explore the ability of Atlantic bottlenose dolphins to elicit communication responses from autistic children. New Perspectives on Our Lives with Companion Animals, 461-465.

Smith, B. A. (1987). Dolphins plus and autistic children. Psychological Perspectives, 18, 187-390.

Smith, B. A. (1988). The autistic person experiences Atlantic bottlenosed dolphins as therapy. The National Aquatics Journal, pp. 5-6.

Smith, B. A., Borguss, B., Borguss, L. & Borguss, R. (1987). Aquatic contact with Atlantic bottlenose dolphins. Anthrozoos, 1, 71-72.

Wessman, A. E., & Ricks, D. F. (1966). Mood and personality. New York: Holt, Rinehart, and Winston.

Wright, J., & Cowden, L. (1986). Changes in self-concept and cardiovascular endurance of mentally retarded youths in a Special Olympics swim training program. Adapted Physical Activity Quarterly, 3, 177-183.

Van Dillon, T. A. (1990). The effects of different mood induction procedures on memory. Unpublished master's thesis, Emporia State University, Emporia, KS.

Zeglen, M. E., Leed, R. G. & Brudvik, D. V. M. (1984). The delta society invitational conference for research on the interactions of animals and people. The Journal of the Delta Society, 1, 6-20.

Appendix A

Informed Consent Document

Informed Consent Document

The Department of Psychology/Special Education supports the practice of protection for human subjects participating in research and related activities. The following information is provided so that you can decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time, and that if you do withdraw from the study, you will not be subjected to reprimand or any other form of reproach.

In order to assess certain aspects of human/dolphin relationships, you are being asked to complete a series of questionnaires. These questionnaires will be completed anonymously. Some activities will be videotaped in order to gain more information. These will be viewed by the researchers only.

"I have read the above statement and have been fully advised of the procedures to be used in this project. I have been given sufficient opportunity to ask any questions I had concerning the procedures and possible risks involved. I understand the potential risks involved and I assume them voluntarily. I likewise understand that I can withdraw from the study at any time without being subjected to reproach."

_____ _____

Subject and/or authorized representative Date

This survey has been designed to protect your privacy and the confidentiality of your responses to the fullest extent possible. Your honest answers to every question and statement are appreciated.

Appendix B

Demographic Information

Demographic Information

INSTRUCTIONS: Please respond to the following questions and statements as honestly as possible. Fill in the blank or circle your selection directly on this survey.

1. What is your age? _____

2. What is your gender? Male Female

3. What is your marital status? Single Married Separated Divorced Widowed

4. Number of children (if applicable) _____

5. What is your occupation? _____

6. How many previous personal contacts with dolphins have you had? _____
   * Approximate total time spent with dolphins? _____

INSTRUCTIONS: Please circle the number which best identifies your ability, (0 represents no ability, while 7 is the highest).

1. How would you rate your swimming ability? 0 1 2 3 4 5 6 7

2. How would you rate your snorkeling ability? 0 1 2 3 4 5 6 7

Appendix C

Wessman and Ricks Scale

Wessman and Ricks Scale

Please read all the following statements, then circle the number that corresponds to how you feel now.

1. Utter sadness and gloom. Completely down. All is black and leaden.

2. Tremendously sad. Feeling terrible, miserable, "Just awful."

3. Sad and feeling very low. Definitely "blue."

4. Spirits low and somewhat "blue."

5. Feeling a bit low. Just so-so.

6. Feeling neutral.

7. Feeling pretty good. "O. K."

8. Feeling very good and cheerful.

9. Happy and in high spirits.

10. Very happy and in very high spirits. Tremendous delight and buoyancy.

11. Complete happiness. Rapturous joy and soaring ecstasy.

Appendix D

Self-Report Information

Self-Report Information

INSTRUCTIONS: Please respond to the following questions and statements as honestly as possible. Fill in the blank or circle your selection directly on this survey.

1. Did a dolphin tow you around by the dorsal fin? YES NO
   If you answered yes, where did this activity take place?
   a. underwater
   b. on the surface
   c. both

   Approximately how long did this activity take place?
   a. 0 - 5 min
   b. 5 - 10 min
   c. 10 - 15 min
   d. 15 - 20 min
   e. 20+ min

2. Did a dolphin rub itself on part of your body? YES NO
   If you answered yes, please indicate where.
   a. on fins
   b. on knees
   c. on legs
   d. on upper body

3. Were you nuzzled by a dolphin? YES NO
   If you answered yes, please indicate where.
   a. stomach
   b. knee
   c. other

4. Were you "mouthed" by a dolphin? YES NO
   (example: dolphin placed mouth around part of your body.)
   If you answered yes, please indicate where.
   a. arm
   b. leg
   c. waist
   d. fins

5. Did a dolphin swim alongside you while playing a game? YES NO
   If you answered yes, indicate which game.
   a. mimicking behaviors
   b. swimming in circles

   Approximately how long did this activity take place?
   a. 0 - 5 min
   b. 5 - 10 min
   c. 10 - 15 min
   d. 15 - 20 min
   e. 20+ min

6. Were you pushed by a dolphin? YES NO
   If you answered yes, how did this activity occur?
   a. rostrum (snout) in stomach
   b. pushed you away from a platform or wall
   c. pectoral fin (side fin) behind knee or elbow
   d. other

7. Did a dolphin slap its tail nearby you? YES NO
   Indicate where this occurred.
   a. on the surface
   b. underwater

8. Did a dolphin jaw clap towards you? YES NO
   (example: quick opening and closing of jaws, usually face to face.)

INSTRUCTIONS: Please circle the number which best identifies your experience, (0 represents no attention, while 7 is highest).

1. In comparison with others in your group, how much attention do you think you received from the dolphin(s)?

0 1 2 3 4 5 6 7

To: All Graduate Students Who Submit a Thesis or Research Problem/Project as Partial Fulfillment of the Requirement for an Advanced Degree

From: Emporia State University Graduate School

I, Jennifer L. O'Loughlin, hereby submit this thesis/report to Emporia State University as partial fulfillment of the requirements for an advanced degree. I agree that the Library of the University may make it available for us in accordance with its regulations governing material of this type. I further agree that quoting, photocopying, or other reproduction of this document is allowed for private study, scholarship (including teaching) and research purposes of a nonprofit nature. No copying which involves potential financial gain will be allowed without written permission of the author.

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July 19, 1994
Date

Examining Specific Aspects of Human Dolphin Interactions in a "Swim-With-Dolphins" Program
Title of Thesis/Research Project

Doug Cooper
Signature of Graduate Office Staff Member

July 19, 1994
Date Received